Citation:

Marques-Vidal P, Gonçalves A, Dias CM. Milk intake is inversely related to obesity in men and in young women: data from the Portuguese Health Interview Survey 1998-1999. *Int J Obes (Lond)*. 2006 Jan;30(1):88-93.

PubMed ID: 16116492

Study Design:

Cross-sectional Study

Class:

D - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

NEUTRAL: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To assess the relationship between milk intake and BMI status using a representative population sample from the Portuguese National Health Interview Survey database.

Inclusion Criteria:

- Subjects living in individual housing
- Main regions of mainland Portugal

Exclusion Criteria:

- Collective housing such as hospitals, prisons, military barracks or retirement houses

Description of Study Protocol:

Recruitment : Subjects were recruited from the National Health Survey conducted between October 1998 and September 1999.

Design : Cross-sectional study

Blinding used (if applicable): not applicable

Intervention (if applicable): not applicable

Statistical Analysis:

- Qualitative variables were measured using X^2-test for between-group comparisons
- Quantitative variables were performed using Student's t-test and multiple univariate analyses were conducted using a general linear model. Post hoc between-group were conducted using

Scheffe's method.
- Relationship between milk and BMI were assessed by Spearman's correlation.
- The odds ratios for obesity according to milk consumption were computed by logistic regression analysis
- Statistical significance was defined as $p<0.01$.

Data Collection Summary:

Timing of Measurements: One time measurement. Socio-educational level, smoking, physical activity, weight, height and average milk consumption were collected from the Survey conducted between October 1998 and September 1999. The questionnaire was applied again for only 10% of the initial sample as a quality control.

Dependent Variables

- Weight and height were self-reported and collected among adults only
- BMI

Independent Variables

- Milk intake: The average daily milk was obtained by the days per week of milk consumed on average per day and glasses of milk consumed on average per day as well as the average volume of each serving assessed by visual aids. Subjects consuming more than 2 litres per day were excluded. Milk consumption was categorized into five groups, one including only nonconsumers and the other four groups represented the quartiles of milk consumption.

Control Variables

- Physical activity was classified in four groups and self-reported
- Educational level classified into four groups
- Smoking assessed into three categories: current, previous, never
- Menopausal women were considered as menopaused if aged $\geq$ 55 years

Description of Actual Data Sample:

Initial N: 48,606

Attrition (final N): 37,513 (M: 17,771; F: 19,742).

Reasons for exclusion: children (8,966); no data for milk intake (137); underweight (1,837); milk consumption more than 2 L/day.

Age: mean age of men was 47.8 years and women 50.3 years

Ethnicity: not mentioned

Other relevant demographics: Women were older than men, had a lower educational level, smoked less, and reported a lower physical activity.

Anthropometrics: Women were more frequently obese and less overweight.

Location: North, Center, greater Lisbon area, Alentejo and Southern Algarve; Portugal.

Summary of Results:

Key Findings

- In men, there was a significant negative relationship between milk consumption and BMI for men and women; r = -0.10 and r = -0.06, respectively, (both p<0.001).
- This relationship remained when the analysis was restricted to subjects who consumed milk; r = -0.10 and r=-0.04 (both p<0.001) for men and women, respectively.
- In men, prevalence of milk consumers was lower in obese (62%) and in overweight (68%) than in normal weight subjects (71%, P < 0.001).
- After adjustment for confounding variables, milk intake decreased with increasing BMI (adjusted mean 280 ± 5, 266 ± 5 and 246 ± 7 ml/day for normal, overweight and obese subjects, respectively, P , 0.001), even after excluding subjects who did not consume milk (368 ± 5, 353 ± 6, and 346 ± 8 ml/day, P < 0.02).
- In women, prevalence of milk consumers was lower in obese (71%), and in overweight (72%) than in normal weight subjects (76%, P < 0.001).
- In women less than 55 years old, an inverse relationship between milk intake and BMI was found (r=-0.11, p<0.001), but not in the older age group (more than 55 years old).

Author Conclusion:

Increased milk intake and possible calcium consumption is slightly but significantly inversely related to BMI, and that obese or overweight subjects have a lower reported milk intake than normal weight subjects. The lack of relationship in older women might be due to the hormonal status, but awaits further investigation.

Reviewer Comments:

- *Most of the population seemed to be slightly overweight but not obese which make the sample closer to a more health weight representative group.*
- *Weight and height were self-reported which can underestimate overweight and obesity.*
- *Milk consumption cut off points were different between genders; lowest quintile was higher for men.*
- *Calcium intake was restricted to milk consumption, therefore, it can not be taken as the main reason for the outcomes as suggested by the authors.*
- *Finally, menopause women included in the sample did not have any available data about their hormonal status.*

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions

1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	Yes

2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	Yes

Validity Questions

1.	**Was the research question clearly stated?**	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	**Was the selection of study subjects/patients free from bias?**	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	Yes
3.	**Were study groups comparable?**	N/A
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	N/A
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	N/A
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	N/A
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	N/A

3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	**Was method of handling withdrawals described?**	Yes
4.1.	Were follow-up methods described and the same for all groups?	N/A
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	No
4.4.	Were reasons for withdrawals similar across groups?	N/A
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	**Was blinding used to prevent introduction of bias?**	???
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	N/A
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	???
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	**Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?**	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	N/A
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	N/A

6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	N/A
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	**Were outcomes clearly defined and the measurements valid and reliable?**	No
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	N/A
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	No
7.5.	Was the measurement of effect at an appropriate level of precision?	Yes
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes
7.7.	Were the measurements conducted consistently across groups?	N/A
8.	**Was the statistical analysis appropriate for the study design and type of outcome indicators?**	Yes
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
8.6.	Was clinical significance as well as statistical significance reported?	Yes
8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	**Are conclusions supported by results with biases and limitations taken into consideration?**	Yes
9.1.	Is there a discussion of findings?	Yes

9.2.	Are biases and study limitations identified and discussed?	Yes
10.	**Is bias due to study's funding or sponsorship unlikely?**	Yes
10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	Yes